

WHOLE CLASS LESSON The Game of Pig

Overview

In *The Game of Pig*, children use dice to think about probability and practice adding mentally and on paper. To play the game, children roll the dice and keep a running total of the numbers that come up. Rolling a 1, however, gives the player a score of zero for that turn; rolling two 1s causes the entire score the player has accumulated so far to return to zero. The game gives students the opportunity to think about the likelihood of rolling a 1 or a pair of 1s and also to notice what sums come up more often than others.

The menu activity *Testing Pig Strategies* (see page 145) extends *The Game of Pig* lesson by having the children test strategies against one another. Also, the assessment *Which Number Wins?* (see page 162) provides additional experience with investigating the probabilities of sums generated by rolling two dice.

Before the lesson

Gather these materials:

- Dice, two per pair of students
- Rules for Playing Pig, enlarged and posted (See Blackline Masters section, page 233.)
- One sheet of chart paper, entitled "How Many Rolls to Get a 1?"
- One sheet of chart paper, entitled "Strategies for Pig"

Teaching directions

Part 1: Playing Pig

■ Show the children a pair of dice and have them report what they know about dice. Make sure that children who aren't familiar with dice have a chance to examine them.

■ Teach the rules for playing Pig. Select a child to play a game with you. Present the rules:

1. The goal of the game is to be the first to get a score of 100 or more.
2. Draw two columns on a sheet of paper. Label one with your name and one with your partner's name.
3. Players take turns. When it is your turn, roll the dice as many times as you like, keeping a running total of what you roll. Don't write down the sums, but add them mentally and say them aloud so your partner can check.
4. When you decide to stop rolling, record the total for that round in your column. Then add it to your total sum from the previous rounds.
5. If a 1 comes up on one of the dice, your turn ends and you score zero for that turn. If both dice show 1s, your turn ends and your total score so far goes to zero.

■ As you model the game, use a large sheet of paper or write on the board to show the children how to keep score. Make two columns, one for you and one for the student who plays with you. Start by rolling several times and, assuming you don't get a 1, after each roll have students add the numbers to help you keep your running total. When you decide to stop rolling record your score.



I gave Charlie the dice. He rolled and got a 6 and a 5. "That's 11," he said.

"I agree," I said. "It's important that you check your partner by adding the numbers yourself. Are you going to roll again or stick?"

"I'll go again," Charlie said. This time he rolled a 4 and a 2. "That's 6 more. What do I do?"

"Add the 6 to the 11 in your head," I said.

Charlie thought for a moment. I caught Tomo's eye before he blurted out again. But I didn't stop Andrew or Lee Ann in time. I reminded them about raising their hands.

"Yes, it's 17," Charlie said.

"Are you going to roll more or stick?" I asked.

Other students gave Charlie advice: "Roll." "Stick." "Go again." "No, take it." As children called out advice, I felt as if we were on a television quiz show. I calmed them down.

"I'm going to roll," Charlie said. Some children cheered; others groaned. He rolled and got two 2s.

"That's 4 more," he said, and counted on his fingers. "So I have 21." He looked at my score of 37. "I'll roll again," he said, with some confidence. But his confidence was short-lived. He rolled a 5 and a 1, and clapped his hand to his forehead.

"Oh, no," he said, grinning. "It's a wipeout." I recorded another zero in his column. The children were getting very excited and anxious to play.

"There's one more rule," I said, calling for their attention. "If you get 1s on *both* dice, then you not only lose what you were adding in your head for that round, but your entire score goes back to zero."

This latest information added to the children's glee. Their energy was high, and they began talking among themselves. "He should've stuck." "No, he was just unlucky." "I'd stick after my first roll." "I wouldn't. I'd take a chance."

"Can we play now?" Timmy asked.

"In just a minute," I answered, and quieted the class. "The game is over when one person gets 100."

"Do you have to get exactly 100?" Lisa asked.

"No," I answered, "it's okay to go over 100."

There were no further questions, so I distributed two dice to each pair of children and let them play the game.

Observing the Children

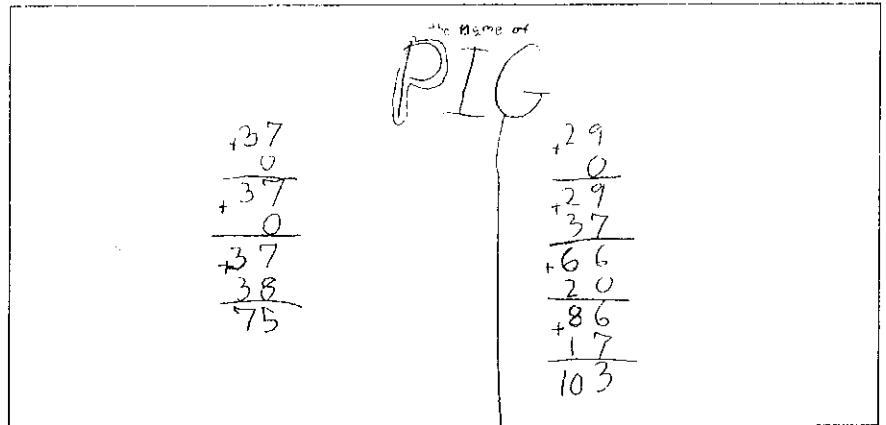
As I circulated, I spent most of my time answering children's questions and helping them to record correctly. I've come to expect confusion when I first introduce an activity. With *The Game of Pig*, children are usually confused about what part they do in their heads and what part they record.

Lori and Amanda were writing down every number they rolled. Then when Lori rolled a 1, she couldn't remember which numbers were from this round and which were from the previous round. Amanda was frustrated, and the two girls came to me for help. I explained again how they were to add in their heads until they decided to stick, and then to record.

"Should we start again?" Amanda asked.



This game between Lori and Amanda was over in four rounds.



"You'll have to decide that," I said. "Don't worry about the mix-up. With a little practice, you'll both catch on."

Ajani came to ask me if he could use a calculator. Calculators were available for the children, and I was curious why he asked me. "Because you said we had to add in our heads," he said.

"Can you add the numbers in your head?" I asked.

"Yes," he nodded, "but there are a lot on the paper." He showed me how he had recorded each number as it came up and had a column of 10 or 11 numbers. "I never got any zeros," he said.

"But I did," his partner, Antonio, said, joining us. He had three zeros in his column. I wasn't sure how the boys were playing the game, but decided to deal with the adding issue first.

"Let's see if you can add the numbers you wrote," I said to Ajani. "You watch, Antonio, to be sure you agree." Though it was a slow process, Ajani worked his way down the column to reach the correct total of 37. Then I explained again to the boys how they were supposed to add in their heads until they decided to stick and then record and add the number to their previous score. They decided to start again. Ajani didn't ask me about the calculator again. If he had, I would have told him that he could use the calculator to check but that he should do the adding in his head as well.

Emelia rushed up to me. "I have a strategy," she said. "Don't roll too much because 1s come up a lot!" She raced back to her partner.

Charlie was playing with Tom. He was shouting, "Oh, no, I don't believe it! I don't believe it!" He was waving his fists in the air triumphantly. I went over to ask him what was so exciting.

"Look," he said, "I had all these zeros." He pointed to a column of eight zeros. "Then I got 96 in one turn. I never rolled a 1."

"If I didn't see it, I wouldn't believe it," Tom said.

"How come you stuck at 96 and didn't keep going?" I asked.

"I didn't want to be too piggy," he said wryly.

I watched Carrie and Maura play. Maura is unsure of herself numerically, but Carrie was helping. However, I noticed she didn't add the numbers in her head, but each time counted on from her previous roll, using her finger to touch each of the dots on the dice. Although Carrie can add



in her head when asked to, she seems to feel safer when counting one by one. "It's better this way," she said to me.

About six of the children in the class also used this strategy of counting dots. Although I'd like the children to become comfortable with adding numbers in their heads, I've learned it's something I can encourage but not force. Two of the six children were in my second-grade class last year. They've made progress in some areas, but their insecurity with numbers persists. I continue to talk with the whole class and individual children about strategies for adding and to provide many opportunities for them to combine numbers. What's important to me is that I continue to encourage the children and not make them feel deficient.

Even though Lee Ann got off to a bad start, she wound up winning the game. (See right-hand column.)

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Part 2: How Many Rolls to Get a 1?

The next day, I had the children play Pig for the first half of the class. Then I called them to attention to introduce Part 2 of the lesson.

I began a class discussion. "Raise your hand if you think you know the chance of rolling a 1 with one die," I said. I waited, scanning the class. As I waited, more and more children raised their hands. When it seemed that about two-thirds of the students had their hands raised, I called on Erin.

"It's 1 out of 6," she said.

"Explain why you think that makes sense," I responded, writing *1 out of 6* on the board.

"Because there are six numbers—1, 2, 3, 4, 5, and 6—," she explained, "and 1 is just one of the six numbers."

"Erin is right," I said. "Does anyone have another way to explain why 1 out of 6 makes sense?" I called on Seth.

"There are six chances," he said, "and only one of the chances is a 1."

I nodded and asked, "Does anyone have another way to explain?" No one did.

NOTE Allowing time before calling on a child gives all of the children a chance to think about the question. Wait time also gives children the message that the teacher would like them to think and isn't necessarily interested in a quick response.

